

Transportation Behavior: How Do We Build A Research Capability?

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"We are all richer than we think we are" (Michele de Montaigne) and "The whole problem of life is to understand one another" (Woodrow Wilson). It is with some fear of overstatement that we apply these lofty personal feelings to transportation research, but it is nevertheless true of our condition. Whether it be transportation in general or ridesharing in particular, there is a vast hemisphere of skill and knowledge awaiting our exploration and exploitation. We have only to find the will and establish the alliances and agreements with which to proceed.

It is to address this vital step that we will only skirt the areas of marketing and hope to offer to those in program planning, operation, and marketing a resource that can multiply the effectiveness and productivity of transportation and of ridesharing.

We will try to spare you a tedious review of where ridesharing has been. We have not done badly for a mode that, while long known and practiced, has been little studied and less understood and has the possible distinction of being the only essentially unsubsidized sector of transportation and perhaps of our society.

With some assistance from the explosion in the price of fuel and the overall economic inflation, ridesharing has become a serious factor in transportation. However, while the fuel crisis that contributed directly and indirectly to transportation costs was perhaps a necessary part of the process of change, it was in most cases not sufficient. Intensive research over the past six years has revealed that the decision to rideshare has been a product of such factors as the congestion and hassle of driving alone, parking problems, information on the nature of ridesharing, as well as the facilitation of access to ridesharing. This last item highlights the tremendous gains made in overcoming the barriers to ridesharing. The advent of vanpooling and buspooling has strengthened the options offered by ridesharing as have the several new information, marketing, brokerage, and matching techniques.

Despite the evident progress, we are here assembled. Research, especially population research in ridesharing, has a more checkered career. It has gone through stages of ad hoc pronouncements to dust-bowl empiricism. The transfer of technology from other research areas ranges from some crude applications of demography, survey methods, marketing, and systems study to more sensitive work in community organization, social and motivational psychology, and marketing.

There is no special virtue to old techniques just because they exist or because the old skill must be marketed. If they do not provide the required solutions, it is the practitioner's responsibility to isolate the real questions and devise or adapt methodology and solutions.

The behavioral and social sciences have misapplied a variety of borrowed methods to ridesharing. These range from the aforementioned sterile type of empiricism, in which we lost the forest for the trees, to some introspective methods that yield little but a hunch and a guess. Careful examination of some of the behavioral approaches reveals an

underlying deviation from the medical model for diagnosis and treatment. Intrapsychic studies and motivations, while useful as a part of the configuration, require closer linkage to the realities of economics, resources, and systems.

We have also obtained conclusions that are so macro or general that they lose applicability to any specific group or situation--losing the trees for the forest. They constitute a kind of hollow generalization rather than a field theory.

Perhaps the holiest of grails has been the search for the perfect model, a "10" among computer formulations. Unfortunately, as with the human prototype, it has been difficult to obtain all of the required elements and even less possible to bring them together into a meaningful system. Reducing the components to digital equivalents while preserving the whole is even more difficult.

While his remarks do not apply to all modeling, Ashby Bloden reminds us that "there's an obvious fallacy in that approach to forecasting. It is thus: occasionally something happens that changes those fundamental relationships, then the forecast goes sailing off into the wild blue yonder...The trouble was compounded by the fact that most econometricians are mathematical types who are fascinated by algebraic models but aren't very interested in what real people actually do out there in the real world. So it takes them a long time to wake up to fundamental changes in people's habits" (Forbes, April 27, 1981, p. 184).

How do we reduce a creature with a predisposition for stubbornness, habit, counterproductive behavior, contrariness, prejudice, etc., to a logical, orderly, predictable, and, above all, reliable system? It is not easy to quote the headline in that same Forbes article, "People Aren't As Dumb As the Economists Seem To Think They Are. That's Why Econometric Models Don't Always Work." The intelligence and adaptability of man along with his vices listed above make modeling a formidable objective.

To proceed with the tale of woe, with the exception of some good research efforts resulting from the determined probing and juggling of Transportation Research Board committees and study sections, the rag-tag progress of current research continues. It is frequently redundant. It grasps at marginal aspects of the problem. It tries to derive new insights from old data as though the contextual conditions were still valid. Scope and generalizability are limited. Questionable samples are used. Research communications lag. We have neither dedicated ridesharing journals nor an institution dedicated to the assembly and dissemination of methodology or information. Meetings focused on research are few, although increasing.

In addition, we have little recruitment and training capability to produce the kind of researchers we need. We are heavy on quantification, but it is possible that we are quantifying before learning the critical variables--let alone their dynamics. Theory development, on the very rare occasions that it takes place, is too often separated from practice. These are, in reality, two sides of the same coin. It is difficult to maintain consistent practice and training in the absence of

theory. Theory without formative evaluation obtained only from practice, is ineffective and not valued or valuable. We need theory to guide the systematic exploration of the various kinds of transportation behavior, in addition to ridesharing, leading to hypotheses for research and formulations for practice.

That would appear to be where we are now. Research is emerging in transportation (and ridesharing) decision making and in the closely related population study and marketing areas. We are increasingly sensitive to user needs and characteristics and we are milling about the entrance to the social, economic, and psychological processes that govern them.

WHAT DO WE NEED FROM RESEARCH?

We need information on which to base policy, to plan programs that will meet the transportation needs generally and the development of ridesharing specifically. Major obstacles have included the following:

1. Several disciplines overlap in providing the needed information;
2. They do not have common or even shared orientations or bases; and
3. Very little has been done to bring them together or even to establish shared goals for the scientist and the practitioner to pursue in parallel or in common.

The disciplines include transportation-engineering and management, economics, psychology, demography, sociology, and marketing. The history of behavioral research in transportation has been marked by an undefineable mixture of efforts to predict demand, affect demand behavior, determine cost/benefit, etc. In an effort to transfer existing techniques to the new requirements, there has been some success but quite a bit of wheel spinning, confusion, or poor communication. Each discipline claimed the virtue of its methods, some of which were useful. Others were not applicable to transportation; necessary but not sufficient; or not able to communicate with the many mills that must grind transportation information (e.g., planning, budget, operations, training, marketing, and evaluation).

There has been no uniform language or body of information. While the situation was not quite a Tower of Babel, we have not had the basis for obtaining or using information effectively.

Instead of writing a textbook on research methodology here, it would seem more constructive and discreet to start defining the common goal areas subject to negotiation.

We need a process for studying the psychological, social, economic, and managerial aspects of the movement of people, individually and in groups, through space, over time, with origins and destinations, within the context of a variety of options and constraints. As a further qualification, it must be recalled that people are creatures of whim, fancy, and habit with varying concepts of reality, style, status, etc.

It is indeed a difficult task, but that is not a reason to shirk the task. The rewards are also great.

The objective would then be a new discipline that takes what it needs from the old. Beginning with the complex area of ridesharing, it would generalize to other areas of transportation.

For the moment, let us call it research in transportation behavior (RTB). It should deal with the relevant aspects of the disciplines listed above and

the full gamut of factors that influence human behavior in the transportation system.

Within this format of a new discipline, a number of problem modalities could be addressed. The implications of economic, psychological, social, and other factors should be considered for each. Some examples follow.

Basic to our needs are sound data for policy development and to serve existing and new programs. These will include

1. Improved use of demography including baseline data and the sophisticated study of the meaning and application of demographic change for transportation and ridesharing;
2. The understanding of factors that influence human transportation decision making including (a) changes in available options--economic, social, logistic; (b) sociological changes affecting economic demand, group process, and group pressure; (c) changes in human perception--individual and group perceptions of cost, comfort, speed, time, distance, etc.; and (d) psychoeconomic factors--fear of harm or loss of property, greed, establishment of demand, need for privacy or affiliation, relative economic mobility, commitment, etc; and
3. Implications of population shift for old and new areas, e.g., effect of known population segments entering a new area (movement of Eastern or Midwestern professional and white-collar workers to Houston and Denver including the effects on Houston and on the sources of the population).

These may be achieved through macro and micro studies of behavior.

Macro studies of behavior involve larger numbers of individuals or political units. Social forces and social processes operating in the larger area are somewhat more predictable as a rule. Learning the dynamics requires extensive study but leads to the capability for planning for the larger divisions.

Information is based on the study of the interaction of macroeconomics of the area--for example, (a) changes in work patterns, locations, and hours; (b) change in the tax base; (c) change in the average income level of the larger group; (d) change in group cohesiveness; and (e) dynamics of changes in effective demand (cumulative). These kinds of data can be integrated with the social process described above and with the political processes and changes as they affect possible policy options.

In developing the methodology for macro studies, other related areas such as cross-cultural research should be examined for methodology extending the limits of RTB beyond those set by survey technology, group methods, and other methods in current use.

Macro studies are useful methods for approaching large populations or major population segments. However, they are usually too gross to permit the development of programs for specific population segments or to provide understanding of the opportunities and problems encountered in working with smaller units.

Micro studies are frequently required when programs are to be directed to more specific target audiences, either for geographical reasons or in an effort to meet the needs of a particular nongeographically contiguous population segment. A necessary step involves the disaggregation of the large population into useful segments.

Subsequent micro study involves both transportation-relevant information and data descriptive of the population characteristics--their occupational status, economic conditions, shopping habits, group cohesiveness, attitudes toward other groups, self-perception, goals and aspirations, readiness to

accept innovation, reference groups, and other motivational information. The integration of these factors into a meaningful understanding of the sub-groups is essential to program development, ride-sharing matching procedures, and effective marketing (the development of incentives and disincentives).

CONTEXTUAL FACTORS

Effective research with large or small population groups requires careful attention to contextual factors that may effect the course of events and the quality of research. Some are enduring--inflation, fuel costs, population density, etc. Others are more transitory and may only be feared (they need never occur to affect events)--strikes, intergroup tension, and inclement weather. These factors have psychological, economic, and political elements. A strike must be considered in all of its ramifications before policy decisions are made.

A steady growth of population density will have different sequelae for intergroup tension in the face of depression or prosperity, rising supply, or price increase. A single incident may trigger long-hidden feelings.

Sensitivity to the presence, dynamics, and effects of such factors is necessary to both planning and subsequent adaptation of programs. The role of ridesharing in transit strikes is well known. Two methods are recommended: (a) forward-looking attention to public affairs and a finger on the pulse of the community and (b) the use of formative evaluation that takes note of perturbations associated with the events, isolates the relationship, and recommends the necessary adjustments.

A sizable list of specific study areas affecting ridesharing is suggested. Each has psychological, social, and economic aspects and cannot be fully understood without interdisciplinary (or pan-disciplinary) study. These topics overlap somewhat and indeed they are interrelated:

1. Acceptance of innovation--a critical area for a mode that faces the barriers of old habit, tradition, and personal convenience and is seldom accepted unless either relative benefit over the older way is demonstrated or the old options are removed or made more difficult;
2. Traveler decision making, motivational, economic, etc.;
3. Transportation management decision making;
4. Social processes and factors in transportation;
5. Factors affecting behavior during travel;
6. Factors affecting satisfaction;
7. Factors affecting mode choices;
8. Factors affecting choice of social conditions for travel;
9. Perception of the several modes by different populations (this may include perceptions of distance traveled, time elapsed, security, level of personal control over travel, density, privacy, convenience, etc.);
10. Critical issues in matching;
11. How groups are formed, how they function, development of roles in the groups, leadership, the role of the driver, coordinator, etc.;
12. Factors affecting the survival of ridesharing groups--techniques for group maintenance;
13. Communication with potential and current riders;
14. Development of participation and commitment in a program;
15. Implications for ridesharing of commute length, commute time, vehicle type, mode type, seasonal or weather-related factors, trip purpose,

traffic congestion, and time constraints; and

16. Meaning of commute to different population segments, e.g., time for thinking, time for recuperation, and time for privacy or sociability.

These and other uses of the commute have proved to be significant factors in the acceptance of a given mode or travel condition. Availability of such information can assist in the design of more suitable modes or more effective matching, e.g., silent carpools or sociable vanpools.

The several topics listed above fall into at least two major research groupings that must be addressed as a whole, as well as in part. First is the development of the delivery system for ridesharing. This includes the entire range of activities from the initiation of the program by a public or private agent to the population studies employed as the basis for planning. It includes agencies, the media campaign, and the less formal methods of promoting and marketing the program. The financing of the program and its vehicles is also involved. It includes the system of work-end or home-end coordinators that may be employed to market the program and match the groups. Further along the delivery system, there are problems of group and program maintenance and evaluation and correction of the overall process.

The delivery system is a complex mechanism that will be somewhat different for each setting and yet have the basic thrust of implementing the program and delivering the product--ridesharing.

Another major grouping of research issues, which overlaps with marketing, includes the issues relating to the public and political perception of the program. Many factors must be included to achieve a good understanding of how the program is seen and whether it is accepted.

Potential cooperation and competition with other modes benefit the community, as well as individuals, employers, land use agencies, and media presentations on ridesharing. These and related issues determine how ridesharing is seen by the elements in the community, whether it is accepted, and what policy is required to achieve acceptance and implementation.

These are but a few of the researchable issues associated with the study of populations for ridesharing and transportation programs. As a body of knowledge develops, it is likely to create as many problems as it solves but these should lead to greater skill and better programs.

SPECIAL RESEARCH AREAS

A number of typical areas may merit attention by ridesharing researchers. Among these are (a) inter-city travel, where cost-effective; (b) vacation and leisure travel; and (c) technological impacts. The last might include design of vehicles for greater comfort, privacy, access, etc., which may facilitate ridesharing; communications technology--a range of telecommunications options already exists ranging from shared radio telephone to warning radio tones relayed to a receiver in each home as the ridesharing vehicle approaches; and express lanes may be only a start in the development of improved ridesharing highway incentives.

RESEARCH OBJECTIVES

In its effort to meet the informational and policy needs of ridesharing and of transportation, we have noted the importance of theory development; in particular a theory that bridges the multiple disciplines that deal with ridesharing behavior. The

special quality of the theory we seek is its ability to bridge the disciplines by selecting from them the elements that explain the phenomena and then to provide formulations that are consistent with the approach of each of the disciplines. Thus, economic behavior overlaps extensively with psychological motivation theory and sociological principles explaining the group processes that affect human work (or transportation activity).

We have also suggested that this is an accretive process in which observations lead to hypotheses, hypotheses to principles, and, finally, a comprehensive body of knowledge and method is collected that permit the development of theoretical systems. These, in turn, provide the framework for a systematic study of ridesharing and for communication between scientists and practitioners.

These principles are of varying character. Some are quite universal in character. They remain valid over time and differing populations. For example, the concept of the goal gradient is true for most people. It states that the closer an individual is to the achievement of an objective, the more powerful the attraction of that objective for him. This is a universal human characteristic. It explains economic and social as well as psychological phenomena. Indeed, if we examine the formulation carefully, it also describes gravitational dynamics in the hard sciences.

The interrupted task effect is another powerful tool. Where a task is begun and then interrupted, it continues to appear to exert a disturbing influence on any intervening tasks until it is itself completed. This principle explains some aspects of work behavior and probably weighs heavily in the general disapproval of split mode transportation systems.

Thus we do have universals that bridge disciplines and are characteristic of human behavior under any circumstances. The development of a network of universals should be one of our prime objectives.

There are, however, other less durable but equally valuable principles--those that change over time or conditions of application. The impact of change in economic cost is a useful example. This effect varies according to many variables, e.g., the value of the unit of cost (money) may be going down steadily (inflation). This reduces the impact of a given price change. Age differences, the availability of money, who earned the money, etc., are only a few of the factors affecting perceived cost that is so important to marketing, economics, psychology, and politics.

Closely related and useful in understanding the effect of changes in economic cost is the just noticeable difference. This venerable psychological principle explains why a gradual increase in the cost of an item (e.g., fuel) over a six-month period in small steps (e.g., one-half cent/week) is much less disturbing than a sudden but equivalent increase of 6.5 cents/gal. The 6.5 cents is more than a just noticeable difference, one-half cent/week is less.

Other rules of behavior are true for limited geographic areas, socioeconomic groups, or cultures. Thus acceptance of innovation may be greater in a highly mobile and fluid situation than in a stable one. It is more easily accomplished in upwardly mobile economic or social settings than in relatively downward mobile economic or social situations. Thus, responses to a question about trying a new mode may differ for different population samples.

Until the actual economic squeeze is felt, those who are losing ground in the economic race may actually show more resistance to the acceptance of

ridesharing than their more fortunate fellow citizens. When the punch is felt, a response reversal can be expected--although it may be longer in coming for some populations for other psychological and sociological reasons.

We have demonstrated several levels of certainty, and in the course of doing so we noted the heavy interdependence of the social and behavioral sciences in this task of explaining transportation behavior. The successful bridging of the disciplines will lend a kind of hybrid vigor to the new discipline, a vigor derived from its ability to deal with varying climates and conditions and with the surprising adaptability and perversity of man.

A comment on Heisenberg's Principle of Uncertainty should be offered here. It applies to behavior as well as to subatomic particles. When information or prediction about behavior is made available to an individual or group, it is likely to alter or even reverse the behavior. So much for linear and long-range projections. The U.S. Census Bureau report describing the decline in the use of public transportation for commuting from 1970-1977, despite large increases in fuel costs and greater availability of public transportation, carries a clear message.

An even more dramatic statement of the predictable unpredictability of man is the apparent conflict between the band-wagon effect and running scared in politics. Does the candidate want to lead or lag in the polls? Each may be useful. If he is not far enough ahead to make it look like a sure victory, he is better off being the underdog to obtain the added effort of his supporters and the sympathy of the undecided voter. Prediction is uncertain.

SIGNIFICANT NEXT STEPS

We have touched on some of the needs and caveats of research. They should not be understated. However, for this audience, it may be even more important to cite some of the significant next steps.

Manpower recruitment is a critical need. There are not enough well-trained transportation researchers; there are fewer in ridesharing. We must reach the gatekeepers--the professors of the several disciplines and their students. Writing for economic, psychology, and other journals will help. Developing and teaching courses that demonstrate the applicability of the discipline to transportation provides even more intimate contact and career modeling potential.

Is there a prescription for transportation behavior researchers? There is only the formula for good scientists--open mindedness, problem solving, a heuristic approach, and, where possible, cross-disciplinary experience as well as real interest in the subject.

What levels of research do we need? Clearly there is a need for full-time dedicated people. Some will have to be borrowed from the old disciplines. Time, it is hoped, will change this condition.

There is also a need for research training and orientation for those who will not spend full time in research as well as for transportation managerial and program people who will cooperate in research and evaluation. Even more important is their learning how to make use of research: to criticize it and to direct it to better serve their needs. These are the two sides of the coin we spoke of earlier.

Research tools and terms--where do they come from? Researchers, being the "ornery bunch" they are, will do their own creating. A number of "creations" are needed. Terminology can never be regi-

mented, but definitions can be helpful.

Technology transfer is critical. Reinventing the wheel should be avoided, if we can rename or adapt that wheel to our needs. How we blend the borrowed materials with transportation principles is more difficult, but not impossible.

The development of survey and interview methodologies for groups and individuals and the development of suitable statistical and data-processing methodology are surely needed.

When these have begun, and also in order to help them begin, a comprehensive data base is recommended. Recommendations for a data or research bank with the capacity for continually monitoring the state of the art and its findings have been made to the Federal Highway Administration. Such a mechanism would contribute much to increased productivity in ridesharing research.

Dissemination or communication of innovation and

findings within ridesharing to related areas of transportation and to related disciplines is a necessary part of the task of developing viable research in transportation behavior. The research bank suggested above can be a valuable adjunct to existing dissemination mechanisms. Other tasks remain. Ethics and standards, certification of skills (if needed), and the generation of new and needed research and the funds to support it, all are part of the fabric of a new research effort in ridesharing behavior.

It is likely that continuing task forces will be recommended for many activities described at this workshop. Rather than fight the trend, it does follow logically that some group be handed the baton for the continued development of what is a sound and emerging discipline and that has a long and potentially productive future.

Ridesharing Marketing: The Portland Experience

Byron York and Pamela Bloomfield

The promotion of ridesharing emerged in the early 1970s out of a crisis that for the first time made American drivers stop and take an urgent look at an old and comfortable habit--the consumption of gasoline. What was before that time no more than a taken-for-granted utility became a collapsing bridge between the driver and his or her destination.

Ridesharing was certainly nothing new, except to the extent that the more ridesharing that occurred, the more the energy shortage would be mitigated. With the recognition that there was no obvious profit to be made in promoting ridesharing, it became the responsibility of the public sector.

In the hands of the public sector, ridesharing presented mixed blessings. Because it was neither capital nor particularly labor-intensive, the cost seemed extremely small when compared with potential benefits. What the public sector encountered in trying to motivate increased ridesharing were such familiar functions as administration and operation of basic services, i.e., carpool matching. What remained was promotion or marketing--a skill in which the public sector was not as adept and continues to be one of the major challenges among rideshare projects--to change travel behavior through more-effective marketing techniques.

This paper discusses the Portland area (Tri-Met) rideshare project's experience--where we started, where we are, and where we think we are going. It is also intended to evoke the opinions, comments, and experiences of other rideshare projects in order that the Tri-Met rideshare project can change and refine its own efforts.

THE EARLY YEARS

The Oil Embargo as Catalyst

The nationwide fuel shortages caused by the oil embargo of 1973-1974 triggered the first organized efforts to develop and promote carpool programs. The Oregon Department of Transportation (ODOT) was the first recipient in the country of emergency assistance from the Federal Highway Administration (FHWA)

within the U.S. Department of Transportation. With \$225 000 in federal aid, ODOT organized a carpool program, targeting the Portland metropolitan area. Little was known about the size and characteristics of the potential market, nor was there any prior experience in devising cost-effective methods of tapping the potential market. Nevertheless, the severe fuel shortage situation had generated a ready market for alternatives to solo driving. At the peak of the embargo crisis, four telephone operators worked double shifts to field the barrage of calls to the carpool program.

The Tri-County Metropolitan Transportation District of Oregon, known as Tri-Met, took over the carpool program from ODOT in 1975. Tri-Met, the largest transit district in Oregon, serves the Portland-Vancouver metropolitan area. Initial marketing strategies centered around Tri-Met's carpool matching service for two reasons. First, it was believed that drivers and passengers interested in carpooling needed such a service in order to set up workable carpools; and, second, Tri-Met needed to build up a solid data base of carpoolers in order to research some of the most basic unanswered questions regarding carpoolers; i.e., How did carpoolers differ from noncarpoolers? How did carpoolers learn of the Tri-Met matching service? What factors influenced their decisions to carpool? and Were the carpool program and the transit system in competition for the same target markets?

Tri-Met's promotion of the carpool matching service had two components: (a) To reach the general public, public service announcements (PSAs) were obtained at no cost and aired by the electronic media; and (b) to reach commuters, large employers in the area were contacted and informed about Tri-Met's matching service. Both approaches were geared toward increasing the volume of carpoolers who used the matching service.

Initial Research Techniques

Before research into the carpool market could proceed, Tri-Met was confronted with a key methodologi-